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ME#08 - Containerization and Docker

1. Getting Setup

Download ubuntu:16.04

```
C:\Users\Aliyah Marie Fulo>docker images
REPOSITORY    TAG       IMAGE ID       CREATED        SIZE
ubuntu        16.04     9ff95a467e45   3 weeks ago    135MB
```

2. Modifying an Image

Start container with /bin/bash and running ping

```
C:\Users\Aliyah Marie Fulo>docker run -it ubuntu:16.04 /bin/bash

root@4ca7b20eebcd:/#
root@4ca7b20eebcd:/# ping google.com
bash: ping: command not found
```

Update software list

```
root@4ca7b20eebcd:/# apt-get update
Get:1 http://archive.ubuntu.com/ubuntu xenial InRelease [247 kB]
Get:2 http://security.ubuntu.com/ubuntu xenial-security InRelease [109 kB]
Get:3 http://security.ubuntu.com/ubuntu xenial-security/main amd64 Packages [2051 kB]
Get:4 http://archive.ubuntu.com/ubuntu xenial-updates InRelease [109 kB]
Get:5 http://archive.ubuntu.com/ubuntu xenial-backports InRelease [107 kB]
Get:6 http://archive.ubuntu.com/ubuntu xenial/main amd64 Packages [1558 kB]
Get:7 http://security.ubuntu.com/ubuntu xenial-security/restricted amd64 Packages [15.9 kB]
Get:8 http://security.ubuntu.com/ubuntu xenial-security/universe amd64 Packages [984 kB]
Get:9 http://security.ubuntu.com/ubuntu xenial-security/multiverse amd64 Packages [8820 B]
Get:10 http://archive.ubuntu.com/ubuntu xenial/restricted amd64 Packages [14.1 kB]
Get:11 http://archive.ubuntu.com/ubuntu xenial/universe amd64 Packages [9827 kB]
Get:12 http://archive.ubuntu.com/ubuntu xenial/multiverse amd64 Packages [176 kB]
Get:13 http://archive.ubuntu.com/ubuntu xenial-updates/main amd64 Packages [2559 kB]
Get:14 http://archive.ubuntu.com/ubuntu xenial-updates/restricted amd64 Packages [16.4 kB]
Get:15 http://archive.ubuntu.com/ubuntu xenial-updates/universe amd64 Packages [1544 kB]
Get:16 http://archive.ubuntu.com/ubuntu xenial-updates/multiverse amd64 Packages [26.2 kB]
Get:17 http://archive.ubuntu.com/ubuntu xenial-backports/main amd64 Packages [10.9 kB]
Get:18 http://archive.ubuntu.com/ubuntu xenial-backports/universe amd64 Packages [12.7 kB]
Fetched 19.4 MB in 2min 25s (133 kB/s)
Reading package lists... Done
```

Install ping command

```

root@4ca7b20eebcd:/# apt-get install iputils.ping
Reading package lists... Done
Building dependency tree
Reading state information... Done
Note, selecting 'iputils-ping' for regex 'iputils.ping'
The following additional packages will be installed:
  libffi6 libgmp10 libgnutls-openssl27 libgnutls30 libhogweed4 libidn11 libnettle6 libp11-kit0 libtasn1-6
Suggested packages:
  gnutls-bin
The following NEW packages will be installed:
  iputils-ping libffi6 libgmp10 libgnutls-openssl27 libgnutls30 libhogweed4 libidn11 libnettle6 libp11-kit0 libtasn1-6
0 upgraded, 10 newly installed, 0 to remove and 5 not upgraded.
Need to get 1307 kB of archives.
After this operation, 3781 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
Get:1 http://archive.ubuntu.com/ubuntu xenial/main amd64 libgmp10 amd64 2:6.1.0+dfsg-2 [240 kB]
Get:2 http://archive.ubuntu.com/ubuntu xenial-updates/main amd64 libnettle6 amd64 3.2-1ubuntu0.16.04.2 [93.7 kB]
Get:3 http://archive.ubuntu.com/ubuntu xenial-updates/main amd64 libhogweed4 amd64 3.2-1ubuntu0.16.04.2 [136 kB]
Get:4 http://archive.ubuntu.com/ubuntu xenial-updates/main amd64 libidn11 amd64 1.32-3ubuntu1.2 [46.5 kB]
Get:5 http://archive.ubuntu.com/ubuntu xenial/main amd64 libffi6 amd64 3.2.1-4 [17.8 kB]
Get:6 http://archive.ubuntu.com/ubuntu xenial-updates/main amd64 libp11-kit0 amd64 0.23.2-5~ubuntu16.04.2 [107 kB]
Get:7 http://archive.ubuntu.com/ubuntu xenial-updates/main amd64 libtasn1-6 amd64 4.7-3ubuntu0.16.04.3 [43.5 kB]
Get:8 http://archive.ubuntu.com/ubuntu xenial-updates/main amd64 libgnutls30 amd64 3.4.10-4ubuntu1.8 [548 kB]
Get:9 http://archive.ubuntu.com/ubuntu xenial-updates/main amd64 libgnutls-openssl27 amd64 3.4.10-4ubuntu1.8 [21.9 kB]
Get:10 http://archive.ubuntu.com/ubuntu xenial/main amd64 iputils-ping amd64 3:20121221-5ubuntu2 [52.7 kB]
Fetched 1307 kB in 3s (337 kB/s)
debconf: delaying package configuration, since apt-utils is not installed
Selecting previously unselected package libgmp10:amd64.
(Reading database ... 4785 files and directories currently installed.)
Preparing to unpack .../libgmp10_2%3a6.1.0+dfsg-2_amd64.deb ...
Unpacking libgmp10:amd64 (2:6.1.0+dfsg-2) ...
Selecting previously unselected package libnettle6:amd64.
Preparing to unpack .../libnettle6_3.2-1ubuntu0.16.04.2_amd64.deb ...
Unpacking libnettle6:amd64 (3.2-1ubuntu0.16.04.2) ...
Selecting previously unselected package libhogweed4:amd64.
Preparing to unpack .../libhogweed4_3.2-1ubuntu0.16.04.2_amd64.deb ...
Unpacking libhogweed4:amd64 (3.2-1ubuntu0.16.04.2) ...
Selecting previously unselected package libidn11:amd64.
Preparing to unpack .../libidn11_1.32-3ubuntu1.2_amd64.deb ...
Unpacking libidn11:amd64 (1.32-3ubuntu1.2) ...
Selecting previously unselected package libffi6:amd64.
Preparing to unpack .../libffi6_3.2.1-4_amd64.deb ...
Unpacking libffi6:amd64 (3.2.1-4) ...
Selecting previously unselected package libp11-kit0:amd64.
Preparing to unpack .../libp11-kit0_0.23.2-5~ubuntu16.04.2_amd64.deb ...
Unpacking libp11-kit0:amd64 (0.23.2-5~ubuntu16.04.2) ...

```

Use ping

```

root@4ca7b20eebcd:/# ping google.com
PING google.com (142.250.66.78) 56(84) bytes of data.
64 bytes from 142.250.66.78: icmp_seq=1 ttl=37 time=102 ms
64 bytes from 142.250.66.78: icmp_seq=2 ttl=37 time=69.2 ms
64 bytes from 142.250.66.78: icmp_seq=3 ttl=37 time=75.7 ms
64 bytes from 142.250.66.78: icmp_seq=4 ttl=37 time=78.0 ms
64 bytes from 142.250.66.78: icmp_seq=5 ttl=37 time=66.9 ms
64 bytes from 142.250.66.78: icmp_seq=6 ttl=37 time=179 ms
64 bytes from 142.250.66.78: icmp_seq=7 ttl=37 time=92.2 ms
64 bytes from 142.250.66.78: icmp_seq=8 ttl=37 time=99.4 ms
64 bytes from 142.250.66.78: icmp_seq=9 ttl=37 time=66.2 ms

```

3. Committing Changes

Find container

```
C:\Users\Aliyah Marie Fulo> docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	CREATED	STATUS	PORTS	NAMES
4ca7b20eebcd	ubuntu:16.04	"/bin/bash"	10 minutes ago	Exited (127) 8 seconds ago		charming_hermann

Commit new image and verify using docker images

```
C:\Users\Aliyah Marie Fulo> docker commit -a "David Elner" -m "Added ping utility." 4ca delner/ping  
sha256:d1c8619446c77843ca961754c8954eb7487bc1d29dc3800069ccbd02bb133b5d
```

```
C:\Users\Aliyah Marie Fulo> docker images
```

REPOSITORY	TAG	IMAGE ID	CREATED	SIZE
delner/ping	latest	d1c8619446c7	31 seconds ago	170MB
ubuntu	16.04	9ff95a467e45	3 weeks ago	135MB

Run image in a new container

```
C:\Users\Aliyah Marie Fulo> docker run -it --rm delner/ping /bin/bash  
root@ebc9a0baa743:/# ping google.com  
PING google.com (172.217.24.78) 56(84) bytes of data.  
64 bytes from 172.217.24.78: icmp_seq=1 ttl=37 time=70.1 ms  
64 bytes from 172.217.24.78: icmp_seq=2 ttl=37 time=39.6 ms  
64 bytes from 172.217.24.78: icmp_seq=3 ttl=37 time=35.5 ms  
64 bytes from 172.217.24.78: icmp_seq=4 ttl=37 time=38.3 ms  
64 bytes from 172.217.24.78: icmp_seq=5 ttl=37 time=49.3 ms  
^C  
--- google.com ping statistics ---  
5 packets transmitted, 5 received, 0% packet loss, time 4006ms  
rtt min/avg/max/mdev = 35.538/46.612/70.169/12.659 ms  
root@ebc9a0baa743:/#
```